

The Republic of The Union of Myanmar
Ministry of Agriculture and Irrigation
Irrigation Department

**Report of the Flow Measurement by Using
River Surveyor M-9 at Kawhmu Township, Toe River**

Hydrology Branch
2012, December, (30)

Report of the Flow Measurement by Using River Surveyor M-9 at Kawhmu Township , Toe River

Introduction

1. Hydrology Branch was given the assignment to take the flow measurement at Toe river near Kyaik Htaw village by using the River surveyor M-9. This assignment was given from the outcome of the meeting between JICA Team (YCDC) (The Project for the Improvement of water supply, sewerage and Drainage system in Yangon City) and Team of the Irrigation Department headed by Deputy Director General (Lower Myanmar) Irrigation Dept. which was held on 23 Nov 2012 at Head office Yangon.

Location of Station

2. Water level station at Toe river near Kyaik Htaw village , Kawhmu Township, Yangon Region

Field Observation

3. Measuring Discharge by using River surveyor M-9 and taking survey data in both side of River bank and water level were carried out by staff of Hydrology Branch. The mean velocity of Toe River is approximate 0.593 m/sec. Discharge of thr River is 2572.541 m³/ sec measuring by boat using M-9 are taken 2 times.

Result

4. The location map of the flow measurement at Toe river is as shown in Annex (1). The discharge of Toe River taking on (11.12.12) time (10:00) Am is 2572.541 m³/sec and as shown in Annex (2). Cross section of Kokkowa River by using River Surveyor M-9 is as shown in Annex (3). River Cross Section at the water level station is as shown in Annex (4).

Sr. No	Station	Width (m)	Area (m ²)	Mean Velocity (m/s)	Total Discharge (Q) m ³ /sec
1.	Kyaik Htaw Water level station (Toe River)	884.42	4339.9	0.593	2572.541

Water level of Toe river station at (11.12.12) time (10:00) Am is (60) cm.

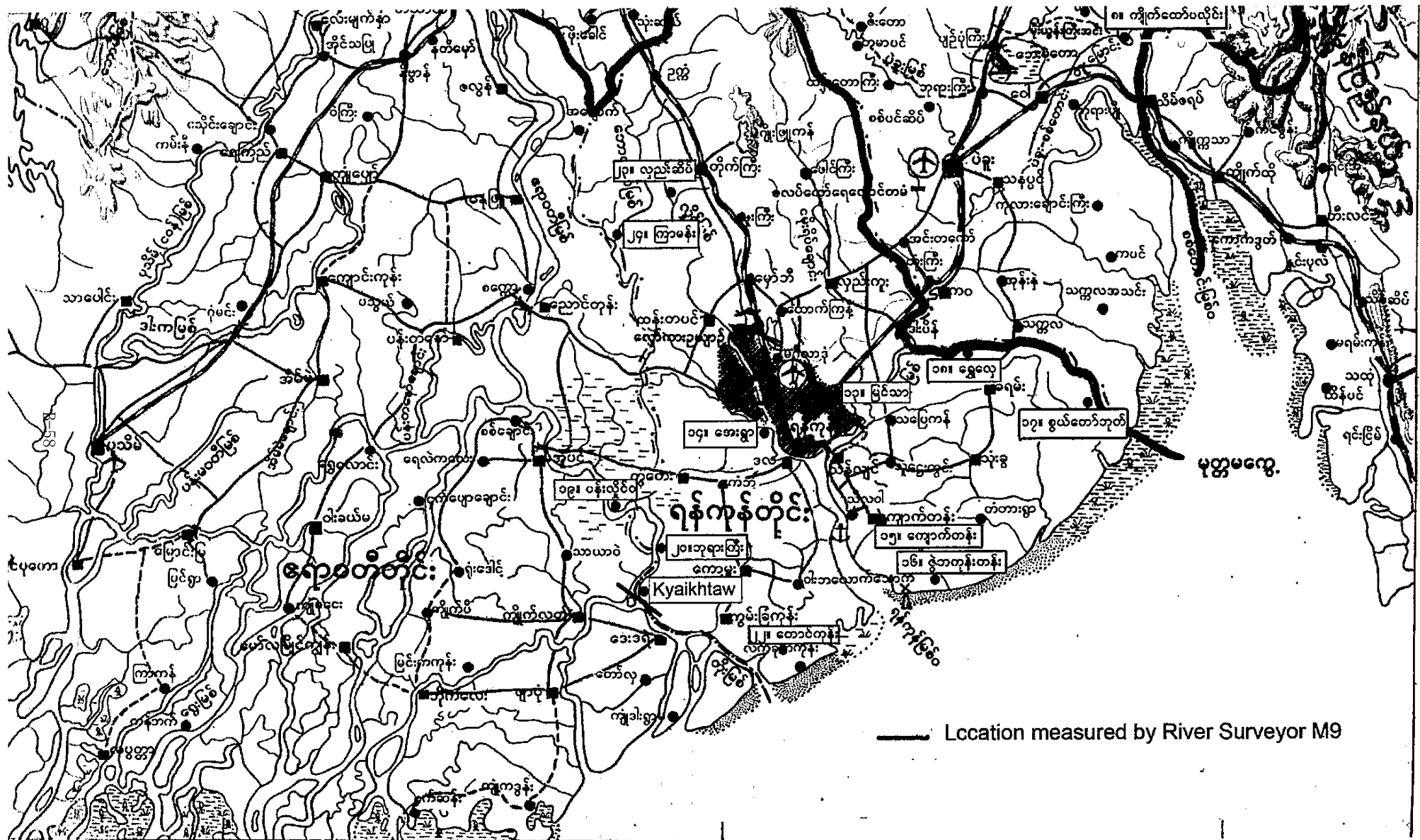
Remark

Measuring of discharge by using River Surveyor M9 are (6) Times . But only (2) times Results are good . (4) times of results are not good because of the Toe River Water Level is rising and the tidal is occurred at the time 10:33 a.m to 11:15 a.m. The velocity is very low and discharge can not be measured actually. Therefore only two time results measuring should be used safety .

The list of the staffs and officers of Hydrology Branch in taking flow measurement at Toe river by using River Surveyor M-9.

Date 11.12.12

Sr.No	Name	Designation	Office
1.	Daw Than Win	Assistant Director	Assistant Director Office Hydrology Branch, Yangon
2.	Daw Khin Si Si Hlaing	S.S.A.E	
3.	U Zaw Min Oo	S.A.E	
4.	U Myint Htwe		
5.	U San Lin Myint	E.S	
6.	Daw Lwin Mar Kywe		
7.	Daw Phyu Hnin Su		



— Location measured by River Surveyor M9

Discharge Measurement Summary

Date Measured: Tuesday, December 11, 2012

Site Information		Measurement Information	
Site Name	Kyaikhtaw	Party	Hydro
Station Number	1	Boat/Motor	Boat
Location	Toe River	Meas. Number	2

System Information		System Setup		Units	
System Type	RS-M9	Transducer Depth (m)	0.08	Distance	m
Serial Number	2365	Salinity (ppt)	0.0	Velocity	m/s
Firmware Version	2.00	Magnetic Declination (deg)	0.8	Area	m ²
Software Version	2.70			Discharge	m ³ /s
				Temperature	degC

Discharge Calculation Settings				Discharge Results	
Track Reference	Bottom-Track	Left Method	Sloped Bank	Width (m)	884.42
Depth Reference	Vertical Beam	Right Method	Sloped Bank	Area (m ²)	4,339.9
Coordinate System	ENU	Top Fit Type	Power Fit	Mean Speed (m/s)	0.593
		Bottom Fit Type	Power Fit	Total Q (m ³ /s)	2,572.541

Measurement Results																		
Tr	Time	Duration	Temp	Distance				Mean Vel		Discharge						%		
				Track	D/C	Width	Area	Boat	Water	Left	Right	Top	Middle	Bottom	Total		M/Total	Measured
1	L	10:03:49 AM	0:10:45	27.0	894.92	876.45	884.95	4,338.4	1.387	0.674	0.11	0.12	233.19	2,210.97	481.67	2,926.053	--	75.6
2	R	10:20:53 AM	0:12:33	27.2	962.92	875.39	883.89	4,341.3	1.279	0.511	0.07	0.08	179.18	1,676.44	363.26	2,219.030	--	75.5
			Mean	27.1	928.92	875.92	884.42	4,339.9	1.333	0.593	0.09	0.10	206.18	1,943.71	422.46	2,572.541	0.000	75.6
			Std Dev	0.1	34.00	0.53	0.53	1.4	0.054	0.082	0.02	0.02	27.01	267.26	59.20	353.512	0.000	0.0
			COV	0.0	0.037	0.001	0.001	0.000	0.041	0.138	0.240	0.178	0.131	0.138	0.140	0.137	0.000	0.000

Exposure Time: 0:23:18

Tr1=20121211100348r.rivr; Tr2=20121211102052r.rivr;

Comments

Tr1=20121211100348r.rivr - 60 cm; Tr2=20121211102052r.rivr - 60 cm;

Compass Calibration

Results: PASS

Score is excellent.

Magnetic interference is very low.

Calibration score: M6.00Q9

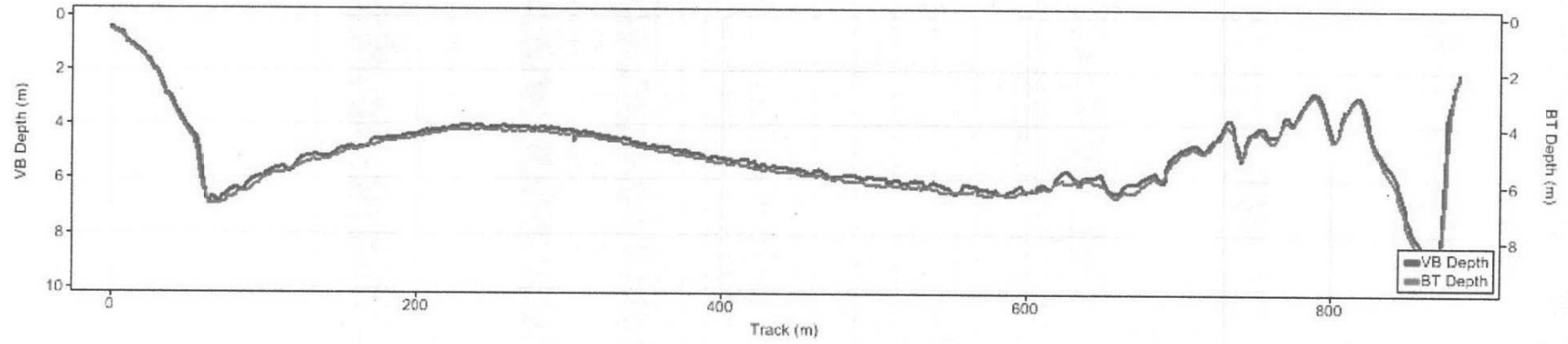
System Test

System Test: PASS

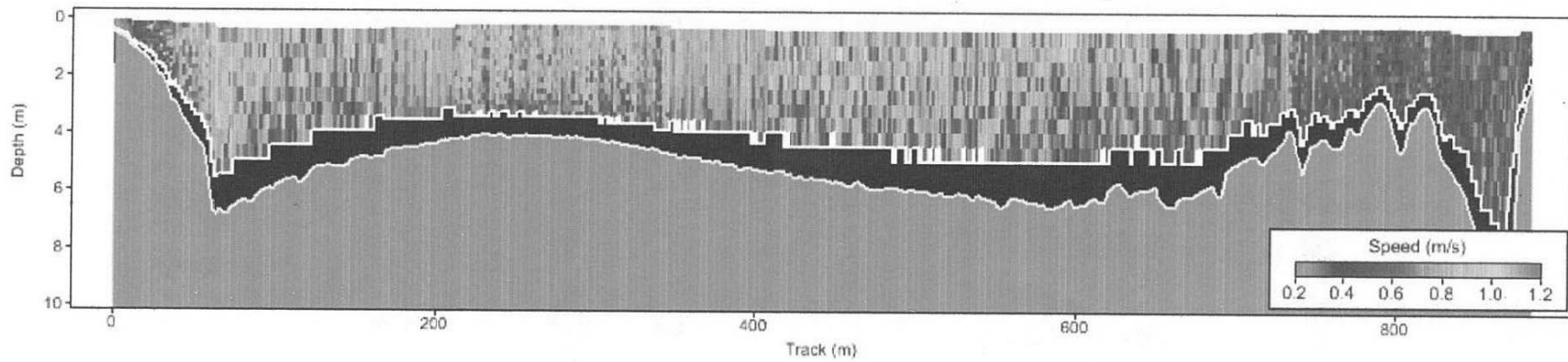
Parameters and settings marked with a * are not constant for all files.

Report generated using SonTek RiverSurveyor Live v2.70

Toe River @ Kyaikhtaw Water Level Station



Cross Section of Toe River



Velocity Distribution of Toe River

Discharge Measurement Summary

Date Measured: Tuesday, December 11, 2012

Site Information		Measurement Information	
Site Name	Kyaikhtaw	Party	Hydro
Station Number	1	Boat/Motor	Boat
Location	Toe River	Meas. Number	6

System Information		System Setup		Units	
System Type	RS-M9	Transducer Depth' (m)	0.08	Distance	m
Serial Number	2365	Salinity (ppt)	0.0	Velocity	m/s
Firmware Version	2.00	Magnetic Declination (deg)	0.8	Area	m ²
Software Version	2.70			Discharge	m ³ /s
				Temperature	degC

Discharge Calculation Settings				Discharge Results	
Track Reference	Bottom-Track	Left Method	Sloped Bank	Width (m)	888.27
Depth Reference	Vertical Beam	Right Method	Sloped Bank	Area (m ²)	4,530.6
Coordinate System	ENU	Top Fit Type	Power Fit	Mean Speed (m/s)	0.339
		Bottom Fit Type	Power Fit	Total Q (m ³ /s)	1,506.755

Measurement Results																
Time	Duration	Distance					Mean Vel		Discharge						% Measured	
		Tran	Lead	DMC	Width	Area	Boat	Water	Left	Right	Top	Middle	Bottom	Total		Misc
10:03:49 AM	0:10:45	27.0	894.92	876.45	884.95	4,338.4	1.387	0.674	0.11	0.12	233.19	2,210.97	481.67	2,926.053	--	75.6
10:20:53 AM	0:12:33	27.2	962.92	875.39	883.89	4,341.3	1.279	0.511	0.07	0.08	179.18	1,676.44	363.26	2,219.030	--	75.5
10:33:42 AM	0:15:30	27.4	953.49	886.07	895.07	4,537.0	1.025	0.359	0.05	0.02	130.78	1,237.92	262.30	1,631.055	--	75.9
10:49:26 AM	0:11:40	27.4	912.61	880.56	889.56	4,583.9	1.304	0.260	0.01	-0.03	96.76	894.44	200.25	1,191.423	--	75.1
11:01:21 AM	0:14:12	27.5	954.93	881.87	890.87	4,653.0	1.121	0.162	0.01	-0.05	61.65	569.33	121.57	752.513	--	75.6
11:15:58 AM	0:12:45	27.8	990.96	876.28	885.28	4,730.1	1.295	0.068	-0.13	-0.07	25.60	242.77	52.28	320.456	--	75.7
	Mean	27.4	944.97	879.44	888.27	4,530.6	1.235	0.339	0.02	0.01	121.19	1,138.65	246.89	1,506.755	0.000	75.6
	Std Dev	0.3	32.04	3.79	3.95	147.4	0.123	0.206	0.07	0.07	69.85	662.73	144.14	876.814	0.000	0.2
	COV	0.0	0.034	0.004	0.004	0.033	0.099	0.607	3.750	5.787	0.576	0.582	0.584	0.582	0.000	0.003

Measure Time: 1:17:25

Tr1=20121211100348r.rivr; Tr2=20121211102052r.rivr; Tr3=20121211103341r.rivr; Tr4=20121211104924r.rivr; Tr5=2012121110119r.rivr; Tr6=2012121111556r.rivr;

Comments

Tr1=20121211100348r.rivr - 60 cm; Tr2=20121211102052r.rivr - 60 cm; Tr3=20121211103341r.rivr - 60 cm; Tr4=20121211104924r.rivr - 60 cm; Tr5=2012121110119r.rivr - 60 cm; Tr6=2012121111556r.rivr - 60 cm;

Compass Calibration

Results: PASS
Compass is excellent.
Magnetic interference is very low.

Calibration score: M6.00Q9

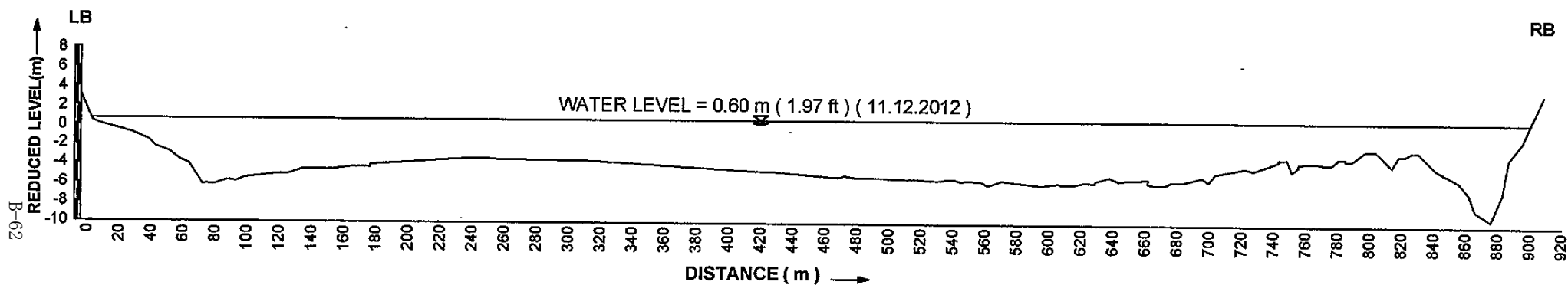
System Test

System Test: PASS

Parameters and settings marked with a * are not constant for all files.

Report generated using SonTek RiverSurveyor Live v2.70

CROSS SECTION OF TOE RIVER ,KAWHMU TOWNSHIP



RD (m)	RL (m)
000.00	-0.00
11.50	0.03
32.33	-0.91
42.75	-1.62
55.25	-2.80
67.75	-4.09
78.17	-6.09
91.92	-5.74
102.33	-5.50
124.00	-5.03
138.58	-4.56
157.33	-4.56
169.83	-4.33
180.25	-4.33
211.50	-3.74
220.67	-3.62
244.83	-3.38
259.42	-3.50
315.67	-3.62
424.00	-4.68
471.92	-5.27
482.33	-5.27
498.17	-5.27
519.83	-5.38
529.00	-5.50
539.83	-5.38
549.00	-5.62
561.50	-5.62
574.00	-5.50
599.00	-5.97
609.42	-5.74
619.00	-5.86
623.33	-5.74
641.50	-5.03
652.33	-5.38
665.87	-5.26
676.08	-5.85
688.58	-5.50
699.00	-5.03
726.08	-4.09
746.92	-3.38
759.42	-3.86
770.67	-3.50
792.75	-3.27
807.33	-2.21
817.75	-3.86
830.25	-2.33
844.83	-4.09
859.42	-5.38
869.83	-6.33
879.42	-9.38
890.67	-3.03
903.50	0.38
912.50	3.62

AREA = 4466.51 m

WETTED PARAMETER P = 904.01 m²

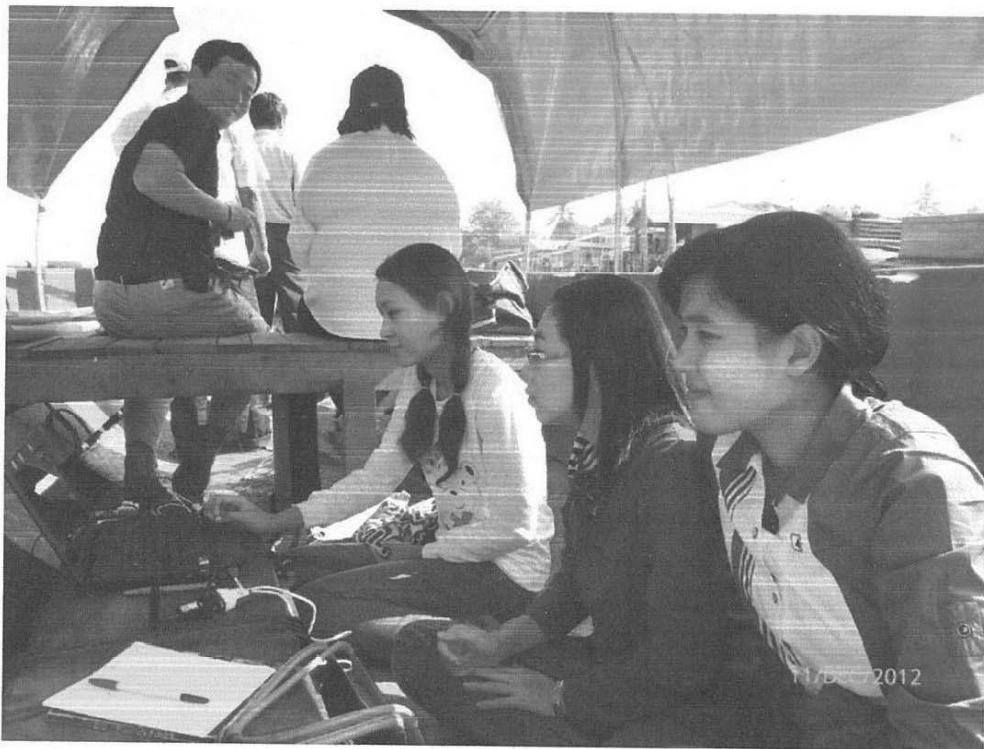
NOTE: TBM = 3.378 m (11.08 ft)

RIVER WIDTH = 897.7 m

X : Y = 1 : 6



Discharge Measured by River Surveyor M 9 at Toe River



Monitoring with Laptop when discharge measured by River Surveyor M9



The Republic of The Union of Myanmar
Ministry of Agriculture and Irrigation
Irrigation Department

**Report of the Flow Measurement by Using
River Surveyor M-9 at Kawhmu Township, Toe River**

Hydrology Branch
2013, April, (18)

**Report of the Flow Measurement by Using River Surveyor M-9 at
Kawhmu Township , Toe River**

Introduction

1. Hydrology Branch was given the assignment to take the flow measurement at Toe river near Kyaik Htaw village by using the River surveyor M-9. This assignment was given by the Head Office. Irrigation Department Letter No. 1804/Siman-1 dated at (14.3.13) and to assist (YCDC) (The Project for the Improvement of water supply, sewerage and Drainage system in Yangon City) .

Location of Station

2. Water level station at Toe river near Kyaik Htaw village, Kawhmu Township, Yangon Region, as indicated in Annex (1).

Field Observation

3. Measuring Discharge by using River Surveyor M-9 and taking survey data in both side of River bank and water level were carried out by staff of Hydrology Branch at (18.3.13). The three no. of Discharge measurements by Boat were taken at that time. Cross Sections and velocity distribution of each measurement are as shown in Annex 4-6. Measuring Time is from 3:15 P.M to 4:15 P.M.

Results

4. The result for Three no of flow measurements are as shown in Annex (2). According the result of one flow measurement, One result should be used to compute the mean discharge and as shown in Annex (3). Detail results are as followed.

-2-

Sr. No	Station	Width (m)	Area (m ²)	Velocity (m/s)	Total Discharge (Q) m ³ /sec
1.	Kyaik Htaw Water level station (Toe River)	953.9	4193.9	0.46	1930.544

Water level of Toe river station at (18.3.13) time (3:15) Pm is (52) cm.

Remark

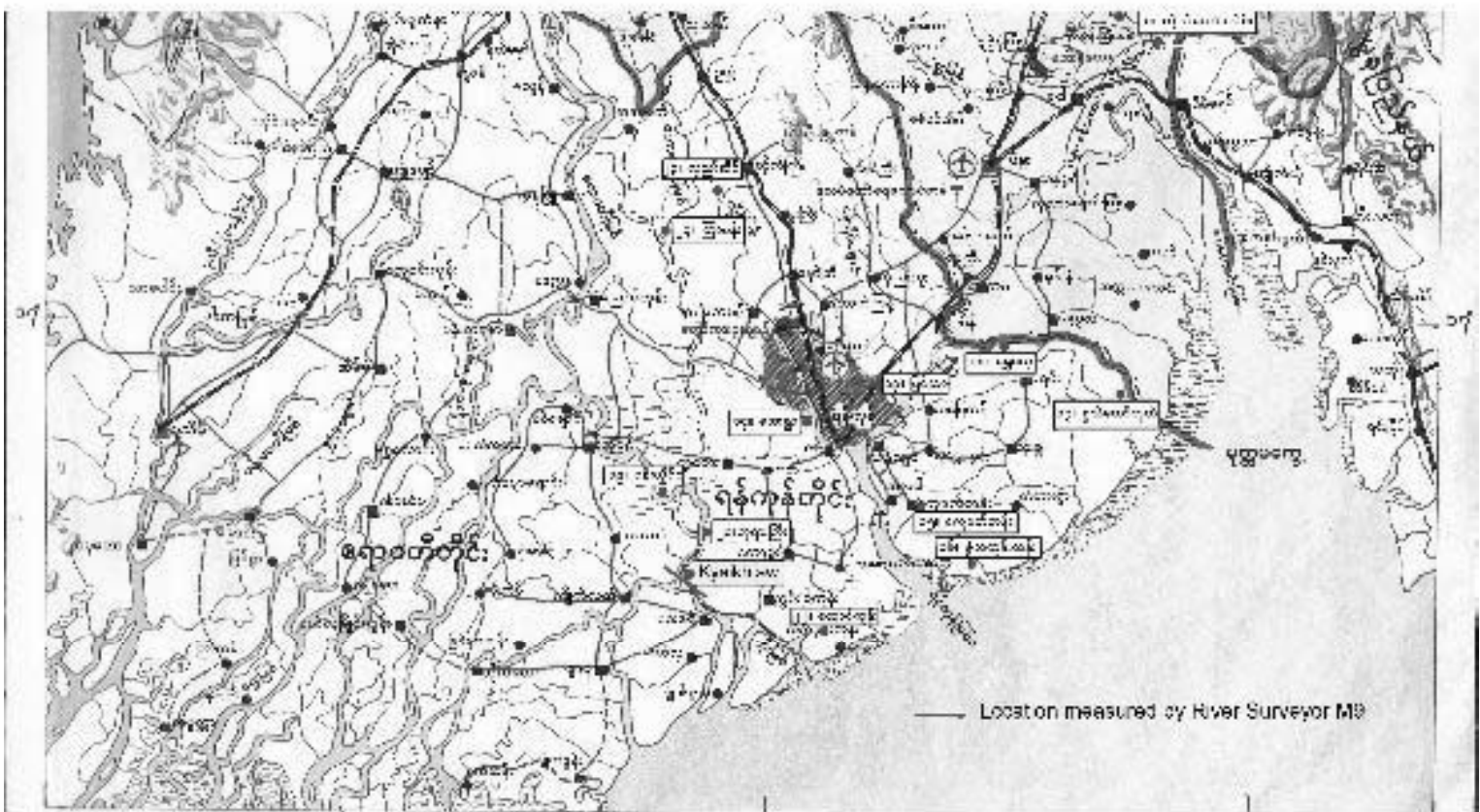
Numbers of Measuring of discharge by using River Surveyor M9 are three times. But only one result of measurement is good. Results of two measurements are considered unreliable, because of the tide effect. Therefore only one time measured result should be used reliably.

The list of the staffs and officers of Hydrology Branch in taking flow measurement at Toe river by using River Surveyor M-9.

Date 18.3.13

Sr.No	Name	Designation	Office
1.	Daw Than Win	Assistant Director	Assistant Director Office Hydrology Branch, Yangon
2.	U Tin Yu	A.E	
3.	U Zaw Min Oo	S.S.A.E	
4.	Daw Khin Si Si Hlaing		
5.	U Sein Lwin	E.S	
6.	Daw Lwin Mar Kywe		
7.	U Thet Wai Htun	A.E	Director Office Hydrology Branch, Yangon

Location Map of the Flow Measurement by using River Surveyor M-9 at Kawhmu Township ,Toe River



Discharge Measurement Summary

Date Measured: Monday, March 18, 2013

Site Information		Measurement Information	
Site Name	Toe River	Party	Hydro
Station Number	1	Boat/Motor	Boat
Location	Toe	Meas. Number	1

System Information		System Setup		Units	
System Type	RS-M9	Transducer Depth (m)	0.08	Distance	m
Serial Number	2365	Salinity (ppt)	0.0	Velocity	m/s
Firmware Version	2.00	Magnetic Declination (deg)	0.8	Area	m ²
Software Version	2.70			Discharge	m ³ /s
				Temperature	degC

Discharge Calculation Settings				Discharge Results	
Track Reference	Bottom-Track	Left Method	Sloped Bank	Width (m)	953.90
Depth Reference	Vertical Beam	Right Method	Sloped Bank	Area (m ²)	4,193.9
Coordinate System	ENU	Top Fit Type	Power Fit	Mean Speed (m/s)	0.460
		Bottom Fit Type	Power Fit	Total Q (m ³ /s)	1,930.544

Measurement Results																	
Tr	Time			Distance				Mean Vel			Discharge						%
#	Time	Duration	Temp.	Track	DMG	Width	Area	Boat	Water	Left	Right	Top	Middle	Bottom	Total	MBTotal	Measured
1	L 3:16:36 PM	0:13:29	30.5	958.68	943.90	953.90	4,193.9	1.185	0.460	0.00	0.25	158.00	1,453.73	318.55	1,930.544	--	75.3
		Mean	30.5	958.68	943.90	953.90	4,193.9	1.185	0.460	0.00	0.25	158.00	1,453.73	318.55	1,930.544	0.000	75.3
		Std Dev	0.0	0.00	0.00	0.00	0.0	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.0
		COV	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Exposure Time: 0:13:29

Tr1=20130318151636r.rivr;

Comments
Tr1=20130318151636r.rivr - 52 cm;

Compass Calibration
Results: PASS Score is excellent. Magnetic interference is very low.
Calibration score: M7.00Q9

System Test
System Test: PASS

Parameters and settings marked with a * are not constant for all files.

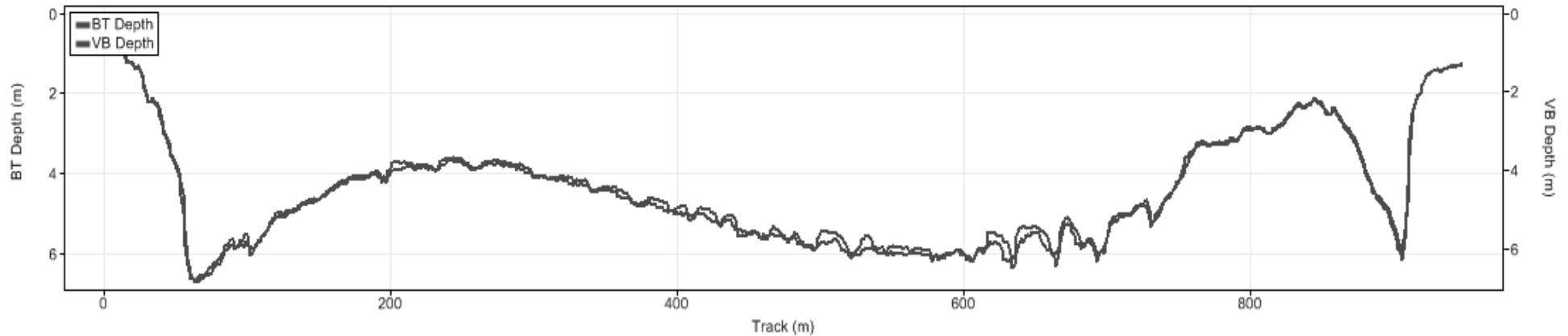
Report generated using SonTek RiverSurveyor Live v2.70

Toe River @ Water Level Station

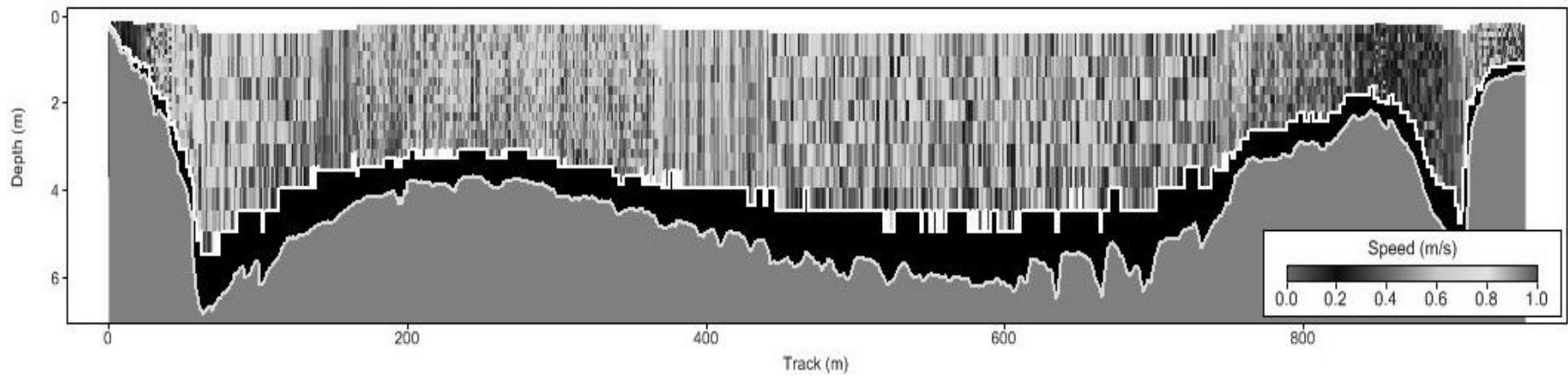
Measure at Time 3:16 P.M

Water Level = 0.52 m

Results Q = 1930.544 cumec



Cross Section of Toe River

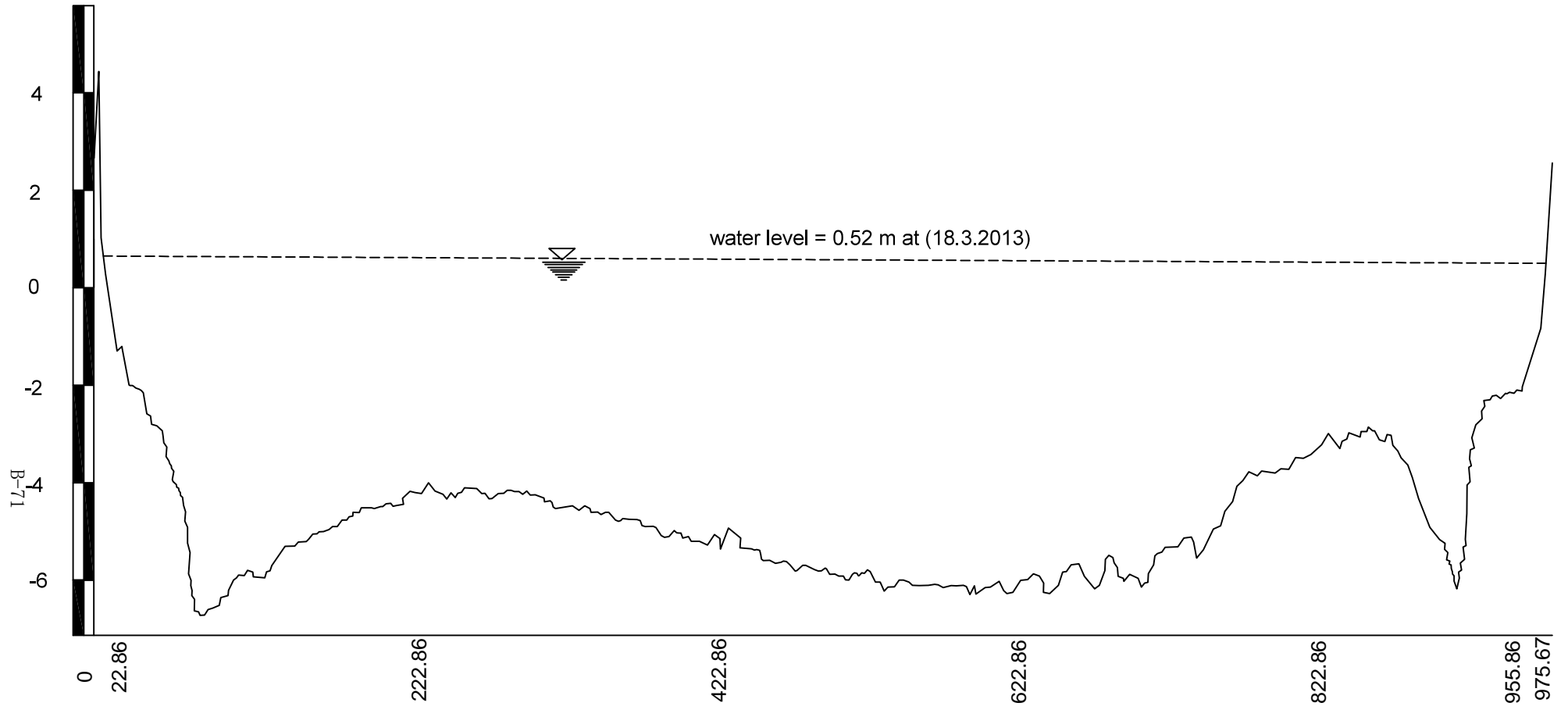


Velocity Distribution of Toe River

B-70

Annex (3)

CROSS SECTION OF TOE RIVER



RL(M)	3.088	-0.92	-4.0	-5.0	-6.0	-3.0	-0.77	3.206
RD (M)	0	22.86	222.86	422.86	622.86	822.86	955.86	975.67

Discharge Measurement Summary

Date Measured: Monday, March 18, 2013

Site Information		Measurement Information	
Site Name	Kyaikhtaw	Party	Hydro
Station Number	1	Boat/Motor	Boat
Location	Toe River	Meas. Number	3

System Information		System Setup		Units	
System Type	RS-M9	Transducer Depth (m)	0.08	Distance	m
Serial Number	2365	Salinity (ppt)	0.0	Velocity	m/s
Firmware Version	2.00	Magnetic Declination (deg)	0.8	Area	m ²
Software Version	2.70			Discharge	m ³ /s
				Temperature	degC

Discharge Calculation Settings				Discharge Results			
Track Reference	Bottom-Track	Left Method	Sloped Bank	Width (m)	946.63		
Depth Reference	Vertical Beam	Right Method	Sloped Bank	Area (m ²)	4,265.9		
Coordinate System	ENU	Top Fit Type	Power Fit	Mean Speed (m/s)	0.296		
		Bottom Fit Type	Power Fit	Total Q (m ³ /s)	1,252.432		

Measurement Results																		
Tr	Time			Distance				Mean Vel			Discharge						%	
#	Time	Duration	Temp.	Track	DMG	Width	Area	Boat	Water	Left	Right	Top	Middle	Bottom	Total	MBTotal	Measured	
1	L	3:16:36 PM	0:13:29	30.5	958.68	943.90	953.90	4,193.9	1.185	0.460	0.00	0.25	158.00	1,453.73	318.55	1,930.544	-	75.3
2	R	3:45:14 PM	0:12:19	30.4	943.69	938.48	948.48	4,245.5	1.277	0.275	0.03	0.51	97.73	876.01	191.77	1,166.050	-	75.1
3	L	3:59:36 PM	0:10:27	29.9	931.09	927.52	937.52	4,358.3	1.485	0.152	-0.04	0.01	53.75	497.33	109.66	660.701	-	75.3
			Mean	30.3	944.49	936.63	946.63	4,265.9	1.316	0.296	0.00	0.26	103.16	942.36	206.66	1,252.432	0.000	75.2
			Std Dev	0.3	11.28	6.82	6.82	68.7	0.125	0.127	0.03	0.21	42.74	393.26	85.93	521.997	0.000	0.1
			COV	0.0	0.012	0.007	0.007	0.016	0.095	0.429	8.043	0.801	0.414	0.417	0.416	0.417	0.000	0.001

Exposure Time: 0:36:15

Tr1=20130318151636r.rivr; Tr2=20130318154513r.rivr; Tr3=20130318155935r.rivr;

Comments

Tr1=20130318151636r.rivr - 52 cm; Tr2=20130318154513r.rivr - 52 cm; Tr3=20130318155935r.rivr - 52 cm;

Compass Calibration

Results: PASS
Score is excellent.
Magnetic interference is very low.

Calibration score: M7.00Q9

System Test

System Test: PASS

Parameters and settings marked with a * are not constant for all files.

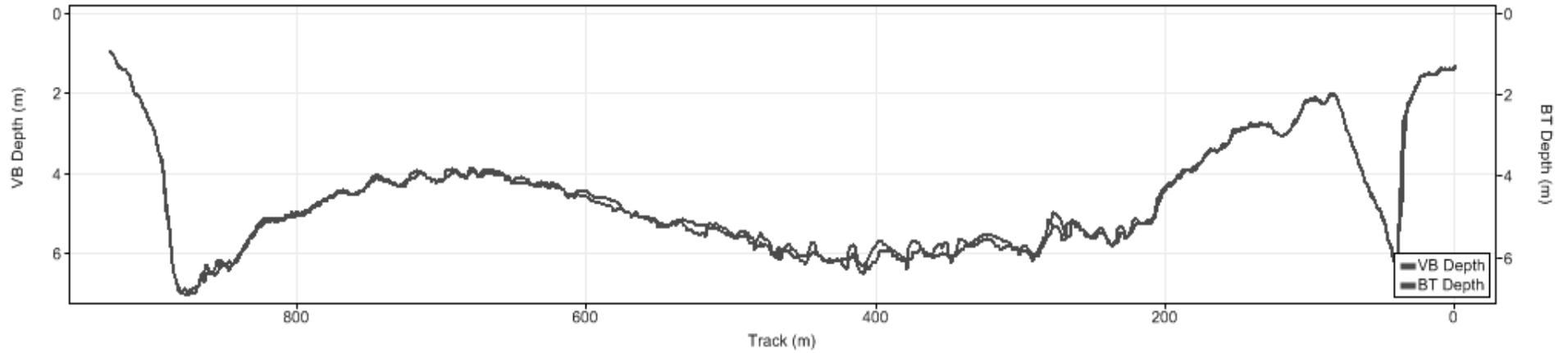
Report generated using SonTek RiverSurveyor Live v2.70

Toe River @ Water Level Station

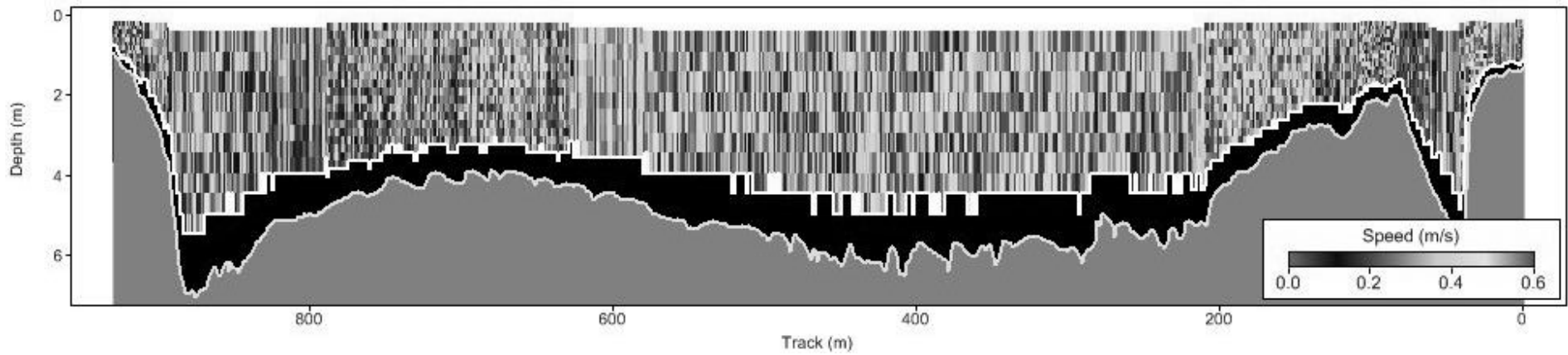
Measure at Time 3:45 P.M

Water Level = 0.52 m

Results Q = 1166.05 cumec



Cross Section of Toe River



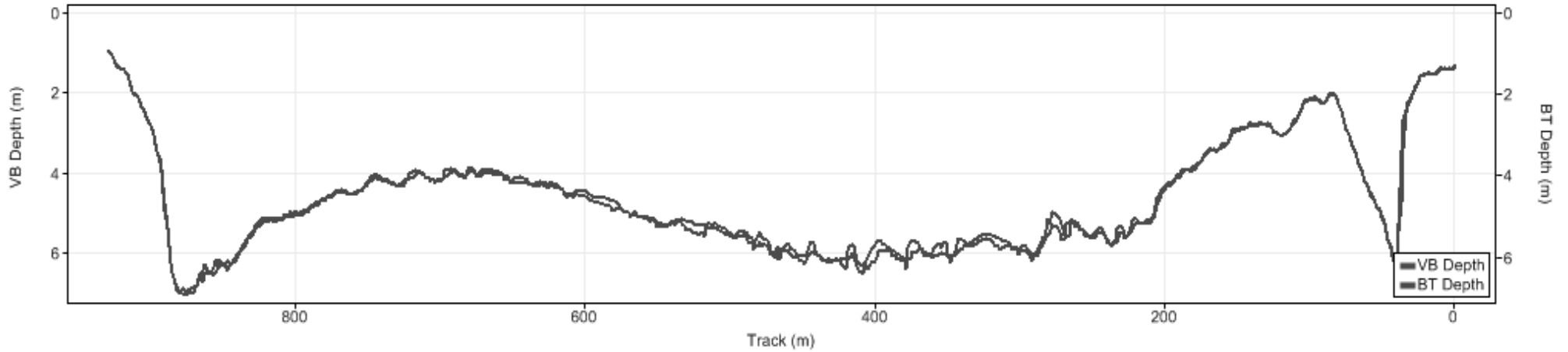
Velocity Distribution of Toe River

Toe River @ Water Level Station

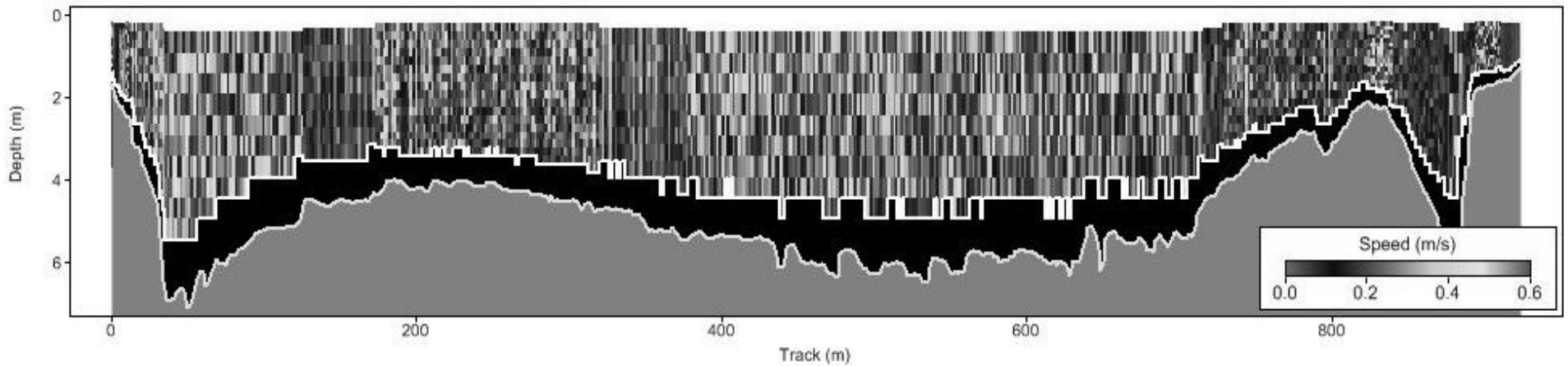
Measure at Time 3:59 P.M

Water Level = 0.52 m

Results Q = 660.701 cumec



Cross Section of Toe River



Velocity Distribution of Toe River



Discharge Measured by River Surveyor M 9 at Toe River



Preparing to measure Discharge by River Surveyor M9



Setting the computer to measure discharge by River Surveyor M9



Water Level Post of Kyaek Hta Water Level Gauge Station